

# Marching forward in neuroimmunology



**As part of Women’s History Month, we are celebrating the contributions of women who stand at the crossroads of immunology and neurobiology.**

**N**eurobiology and immunology have long been taught as separate fields, each with its own distinct terminologies and concepts of cell-to-cell communication. However, those discipline-specific concepts are beginning to blur. For example, both the peripheral nervous system and the immune system consist of sensory elements that can detect and respond to various forms of external and potentially dangerous stimuli; and both neurons and immune cells can form synapses to transmit information to evoke appropriate cellular responses. Lymphoid tissues are innervated, and tissue-resident immune cells are found in the brain, which suggests that the two systems are communicating to achieve tissue homeostasis and coordinate responses to potential threats. Recent studies have identified commonalities in the signaling apparatus shared by the two systems, such as complement components, neuropeptides and their receptors, which indicates that the nervous and immune systems can communicate directly and reciprocally influence each other’s functional activity.

In this March issue of *Nature Immunology*, to celebrate Women’s History Month, we continue our ‘Women in Immunology’ [focus](#) by featuring World Views from researchers whose cross-disciplinary work straddles the fields of neurobiology and immunology. Each author describes their journey and the influences that helped to shape their career path decision to enter the multi-disciplinary field of neuroimmunology. In addition, they describe their

newly recognized duty to act as mentors to the next generation of neuroimmunologists.

Irene Salinas (University of New Mexico, USA) entered the field as a comparative immunologist who studied the evolution of mucosal defenses, which entails studies of non-model organisms such as teleost fish. Hence, she felt a bit of an outsider. She recognized that olfactory sensory neurons are an ancient form of defense against microorganisms and that these sensory neurons communicate with immune cells to protect mucosal tissues. Despite some unflattering receptions by other research communities owing to the unconventional fish models, their findings found a welcome home in the neuroimmunology community.

As with any scientist, an inquisitive nature is essential; however, what do you do when personal observations contradict formal textbook teachings? Robyn Klein (Western University, Canada) describes how recognition during the early days of the AIDS epidemic challenged pre-existing views that the brain and central nervous system (CNS) were immune-privileged sites. She observed that a high proportion of patients with HIV-1 had opportunistic neuroinfectious diseases, suggesting that T cell-mediated immunity can have a protective role in the CNS. Fortunately, she had female mentors early in her career who recognized importance of challenging dogmatic teaching and encouraged investigation of how the immune system protects against neurotrophic pathogens.

Noriko Isobe (Kyushu University, Japan) expressed early self-doubts as she confronted gender-based societal norms for choosing an occupation. However, she had many champions – including her father – who suggested that she follow medicine. She gained confidence by seeing other women pursuing biomedical careers and having the good fortune to have encouraging mentors. They helped her

to open the doors of opportunity, not only for herself, but for others too.

Fabienne Brilot (University of Sydney, Australia) acknowledges the work of earlier generations of female neuroimmunologists, who pioneered studies of autoantibody-mediated neurological diseases. She noted that such translational discoveries were made possible by healthy research environments in which the women had opportunities to lead collaborative clinical research networks. Similar present-day research collaborations and networking – which provide opportunities to both men and women – can lead to fundamental new insights in neuroimmunology.

Jen Gommerman (University of Toronto, Canada) drew inspiration from outside of the scientific norm from the author and activist Jane Jacobs. She provides several analogies between Jacob’s writings on healthy communities and the roles and interactions that occur between immune cells, neurons and glial cells to maintain a healthy CNS tissue environment. She notes similar parallels within the neuroimmunology research ‘neighborhood’. Diversity, crosstalk at the ‘seams’ of scientific disciplines, and community engagement between all stakeholders, regardless of gender or career stage, will build vibrant research communities that welcomes all.

We feel research journals also have a part to play in building healthy, nurturing research communities. These endeavors involve engagement at all levels and promoting diversity in viewpoints across a broad spectrum of our research community. For those who are interested in reading more about publishing initiatives on women’s health studies, see the new [Series](#) launched by our colleagues at *Nature Medicine*. We will continue to march forward with our community. Stay tuned for the next steps!

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